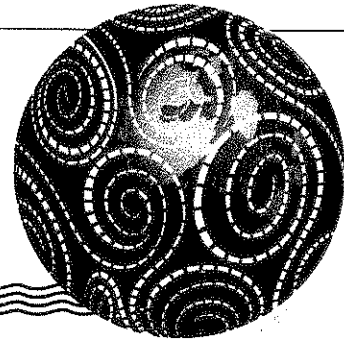


# CLIMATE ALERT

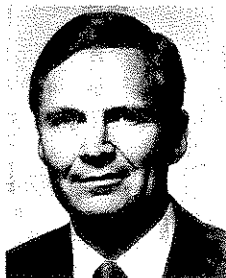


Volume 5, Number 2

May-June 1992

## Study Urges Costing Out Global Warming for Next 300 Years

A new analysis of the economic costs of global warming points out that the conventional benchmark of CO2 doubling by 2050 which most policy-makers use is completely arbitrary. The new study, by William R. Cline of the Institute for International Economics, entitled *Global Warming: The Economic Stakes*, suggests instead using a much longer time horizon of 300 years. Because concentration of CO2 in the atmosphere will continue to increase until 2300, ultimate damages could be far larger than generally recognized, Cline says.



William R. Cline, Senior Fellow, Institute for International Economics

The accumulation of CO2 and other greenhouse gases is cumulative and irreversible over centuries, Cline states. Not until 2300 would deep ocean mixing of CO2 begin to partially reverse the increase in concentrations in the atmosphere. Because the damages are potentially very large, they should be considered now in assessing future impacts, he says. However, he warns that while it

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### INSIDE

- Sir Crispin Tickell Comments on UNCED

## 154 Nations Sign Climate Change Accord

While the Convention on Climate Change launched a process of cooperation aimed at keeping greenhouse gases in the atmosphere within safe limits, said UN Secretary-General Boutros Boutros-Ghali in his closing June 14 Summit statement, the current degree of commitment is not comparable to the scale of the problems.

The Convention sets a goal of stabilizing greenhouse gas concentrations at a level that would prevent dangerous interference with the climate system. The level should be reached within a time-frame that would allow ecosystems to adapt naturally to climate change.

The convention provides for establishment of a Conference of the Parties

to decide on subsequent steps and draft amendments. It also provides for reviewing the implementation of commitments at least twice before the year 2000.

The fact that 154 nations signed the UN Framework Convention on Climate Change and 157 signed the Convention on Biological Diversity contrasts with only 14 nations signing the Vienna Convention on limiting ozone-depleting chemicals when it was first presented in 1985. The roll call as of June 14 of the countries signing each treaty follows. The lists of signatories differ. The lists will remain open at UN Headquarters till June 19, 1993. The Climate Change

(continued on page 5)

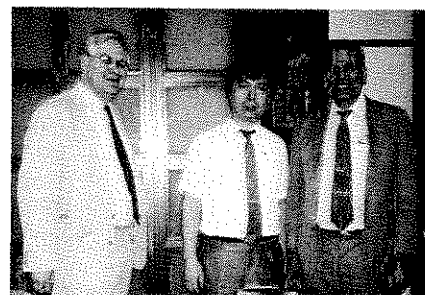
## Eight Nations Join Climate Institute in Developing Climate Change Responses with Asian Bank Support

On May 7, the Climate Institute signed a contract with the Asian Development Bank (ADB) to carry out a 15-month effort to develop national response strategies for climate change in eight nations. This represents the largest project the Institute has ever undertaken.

In cooperation with local consulting teams from each of the eight diverse countries — Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka and Viet Nam — the Institute and a team of international specialists will examine vulnerability to specific climate change impacts. They will rank the cost effectiveness of various options for adaptation to change and for limiting each country's emissions or preserving or expanding its greenhouse gas sinks. The

eight countries contain collectively about 1.4 billion people, over a quarter of the earth's population. The study has been endorsed by governments of each of the concerned countries.

(continued on page 8)



John Topping, President, Climate Institute; Hideyuki Mori, Environment Office, Asian Development Bank; and Ata Qureshi of the Climate Institute, Project Director.

## GUEST COLUMN

## Rio Summit Has Raised Problems That Are Not Going Away

By Sir Crispin Tickell, Warden of Green College, Oxford and Chairman of the Board of Directors of the Climate Institute

We are at that stage of a major international event when no one quite knows what is happening. There is a fog over the jousting grounds of negotiation. Through it can be heard all too familiar slogans and battle cries. The contenders emerge briefly to threaten or posture. As usual most seem to be talking about money.

It would be easy, but wrong, to write off the Earth Summit at Rio. In the 20 years since the Stockholm Conference on the environment, the problems of our planet have got worse, and people the world over have become more aware of them. Our generation is perhaps the first to experience the downside of the industrial revolution. We are beginning to see the accumulated effects of human interference with the environment.

One such effect has been the increase in human numbers: from 10 million at the end of the Ice Age to almost five-and-a-half billion now. There are over 90 million more human beings every year. There are also around 25 million refugees, including economic migrants.

A second effect, linked to population increase, has been the degradation of the land. According to a report published by the World Resources Institute recently, 10 percent of the vegetation-bearing surface — an area equivalent to China and India combined — is suffering moderate to extreme degradation. Most river and coastal waters are also polluted. And demand for fresh water is constantly increasing.

Next, we are changing the chemistry of the atmosphere. We have all heard of acid rain, ozone depletion, and the prospects for global warming.

Last, we humans are destroying other forms of life at a rate to be compared with that following the likely impact of an asteroid 65 million years ago and which finished the long dominance of the dinosaurs. Perhaps a quarter of the earth's total remaining species will be at risk in the next quarter-century.

Some see this as a success story. Most people live longer and better, and hope to live longer and better still. Yet it is clear that unless we can cope with the consequences, the result could be a kind of creeping breakdown of our society.

If I had to encapsulate our crisis in a phrase, I would say that in industrial countries it arises from consumption of resources, and in others from the pressure on resources. A key book in 1972 was *The Limits to Growth*. It was much criticised, often unfairly, but it has stood up pretty well. A key book in 1992, by the same authors, is *Beyond the Limits*. The title speaks for itself.

This is the first time that the world as a whole has faced problems of such complexity. But the problems are not new. In looking at what might happen, remember the fate of Easter Island in the Pacific over a thousand years. A handful of people first arrived by boat; they multiplied; they cut down trees; they cultivated the land; they divided into little nations; they fought each other over diminishing resources; they suffered a drastic decline in numbers and living standards; finally they achieved a miserable stability. By the time the Europeans arrived in the eighteenth century, they found a wreck of a society on an ecological ruin.

No one need go the same way. But it can be avoided only if we raise our eyes to what is happening. People may be increasingly uneasy, but they have not yet changed their idea of the world. New thoughts jostle unconformably with old ones.

One of the most depressing aspects of preparations for the summit was the resurrection of overtaken arguments about development. The industrial countries captured the word 'environment' and the rest of the world 'development', and then each talked almost meaninglessly across the other. The so-called developed countries pitched one camp, and the so-called developing ones pitched another.

The industrial countries tend to think of environmental problems as mainly involving others. They are, of course, responsible for most of the mess (they put over 70 percent of human carbon emissions into the atmosphere, of which 23 percent come from the United States alone). Their consumption patterns are a root cause, but so far they are unchanged. By not giving an example of restraint, but continuing to preach it to others, they have lacked credibility throughout the preparations for Rio.

On the other side, the non-industrial countries believe they have new leverage in demanding transfers of wealth. They see a bargain in which they trade some measure of environmental restraint against unconditional aid, debt forgiveness and new terms of trade. Many see concern in industrial countries about the environment as a trap to keep them in poverty. Environmental change will affect each country differently, but the poor, with their limited resources, are far more vulnerable. Most industrial countries should be able to manage, but they could scarcely prosper in a world where they would be a shrinking proportion of its population, subject to invasion, infiltration and the pollution of others. Wealth and poverty cannot sit together for long.

*(continued on page 3)*

## CLIMATE ALERT

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# Climate Institute News

(The Institute's new Asian Development Bank Project is described on page 1.)

## Board Meeting Approves Changes

At an April 1 meeting at Green College, Oxford, **Dr. Ata Qureshi** the Institute's Director of Global Environment Programs, was elected to the Board of Directors.

**Mark Goldberg** was elected to the newly created position of Vice Chairman.

An executive committee consisting of 7 officers of the Board was formed.

## Sir Crispin Tickell Visits Beijing

Sir Crispin attended a week-long meeting of the China Council for International Co-operation in Environment and Development in mid-April. He has been appointed to a five-year term on the Council, which was created by the Chinese Government and is composed half of Chinese and half of eminent people from the world outside. It has appointed working groups on particular environmental problems, including climate change. The Council met with

the Chinese Premier who was reported to show lively awareness of climate issues. Sir Crispin later met with the Director of the Institute of Geography of the Chinese Academy of Sciences and some of his colleagues and learned of deep Chinese concern over the vulnerability of Chinese agriculture to climate change.

## Schneider Receives MacArthur Fellowship

Stephen Schneider, an Institute Board member, was one of 33 people named on June 15 to receive the annual MacArthur awards.

Starting in early September, Schneider will take a leave of absence from the National Center for Atmospheric Research in Boulder, CO, to become a professor in the Biological Sciences Department of Stanford University where he will also be affiliated with the Institute for International Studies. He may use his award to get things in place in Stanford.

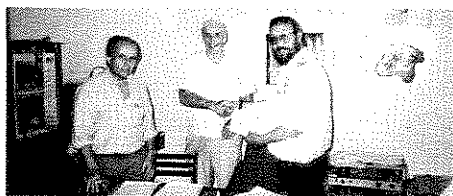
**Dr. Brian Stocks (Canada), Dr. Eric Valendick (Russia) and Dr. Michael Fosberg (USA) signing Protocols for Stand Replacement Fire Working Group of the International Boreal Forest Research Association.**

## New Boreal Forest Research Group Meets

Although 25 percent of the world's forests are boreal, we know more about the rainforests of the Amazon than we do about boreal forests, according to Dr. Michael Fosberg of the U.S. Forest Service.

Dr. Fosberg represented the U.S. in a May 18-22 working group meeting of the year-old International Boreal Forest Research Association in Krasnoyarsk, Russia. The Association has representatives from the U.S., Canada, Russia, Norway, Sweden and Finland.

The working group will foster cooperative research on stand replacement ecology, especially after forest fires, and promote sustainable development of the taiga (coniferous forests in the far northern regions of Eurasia and North America). One aim is to develop a strategy for management of the potentially increased incidence of wildfires under global climate change.



## Rio Summit

(Continued from page 2)

The summit has already done good service. It has focused people's minds on issues which were unfamiliar. It has also brought together a consensus on most of the agenda. Few now contest the need for inter-generational equity, respect for other forms of life, acceptance of ultimate limits to growth, recognition of global interdependence, stable population levels, and a merger of environment and economics in decision-making. Even if the phrase 'sustainable development' means different things to different people, it is still valid as a guideline.

The texts for Rio are disappointing. I can well see why governments would hesitate before putting their names to them. They are badly drafted, they involve a minimum commitment and contain financial ambiguities, or worse.

I can also see why governments do not like the bulky ragbag of issues in

Agenda 21 (or world agenda for the next century). Negotiations on these texts were flawed from the start. The Americans played an inglorious role. By being dog-in-the-manger they greatly damaged prospects for a real bargain. The other industrial countries were reluctant even to begin the necessary transformation of their own economies, and the poor countries, observing this but forgetting their own vulnerability, simply asked for more compensation and more aid.

Yet the process has begun. The problems on and off the agenda at Rio are not going away. It is absurd that the biggest environmental problem of all — human population increase — is scarcely there at all. Rio should be seen as a beginning. In that respect it can be compared with the process for dealing with ozone depletion: first a framework convention, then specific protocols for action, then tighter arguments as the science advances.

At Rio we should expect neither outstanding success nor spectacular failure. Most important is what happens afterwards. Such bodies as the United Nations Environment Programme must get enough money to monitor whatever agreements are reached. We need some political institution, meeting every year to report progress and take initiatives. We also need a more determined effort from the Secretary-General to coordinate the environmental work of the UN agencies and associated bodies (including the World Bank and the International Monetary Fund).

Above all, we need greater understanding of issues. Beyond the fog and clash of antique arguments lies the prospect of such understanding. Rio could have no better memorial. (Reprinted by permission of the Sunday Observer, June 7, 1992.)



# Climate News Around the World

## El Nino

Vernon Kousky, research meteorologist of the U.S. National Weather Service's Climate Analysis Center, has given the following



Vernon Kousky, NOAA and John C. Topping in Brasilia.

informal "outlook" for El Nino in 1992: up until next November, northeast Brazil, Central America, and India are liable to find vital rains short of normal or even failing. Indonesia and the Philippines are already dry and likely to see continued drought till fall. Heavier than normal rainfall is likely in southern Brazil, northeast Argentina, and the central tropical Pacific.

Reports document that the U.S. Pacific Northwest has been abnormally dry. (See report below.) The U.S. Southwest has received excessive rain from El Nino this spring.

Peter Usher, head of the climate change unit of UNEP in Nairobi, said he believes El Nino was responsible for this winter's absence of heavy rains in Africa which usually occur in December and January.

## Africa

The worst drought of the 20th century has struck southern Africa, and meteorologists have warned that it is spreading north to engulf the entire eastern side of the continent. Ten nations from the Cape to Cairo — some of them normally food-exporting countries — will be forced to import grain in the coming year. Zimbabwe and Mozambique are the hardest hit, but also affected are Angola, Botswana, Lesotho, Malawi, Namibia, South Africa, Swaziland and Zambia. Dr. Workneh Degefu, head of the World Meteorological Organization's drought monitoring center for eastern and southern Africa, said the poor rains in Ethiopia would affect not only that country but also Egypt because the major source of the Nile lies in western Ethiopia.

The El Nino of 1983 was followed by the drought and severe famine of Ethiopia and the Sudan in 1984, and the El Nino of 1987 by a lesser famine in 1988. The situation resulting from the 1991 El Nino's effects is already worse than the 1984-85 experience.

One estimate puts 115 million people in southern Africa on the brink of catastrophe, and another says at least 18 million are at risk of perishing. Lionel Rosenblatt, executive director of Refugees International, claims that more than 12 million tons of maize must reach people in southern Africa alone, requiring more effort than has ever been achieved in this region. Political difficulties complicate organizational tasks ahead.

## Zimbabwe

Water shortages are causing industries and schools to shut down. The sugar crop has been wiped out. The once-sophisticated dairy industry is subsisting at survival levels. With crops and cattle dead, malnutrition is widespread. Not only are crops for future consumption failing, but already cornmeal, a dietary staple, is difficult to buy.

Zimbabwe's difficulties will affect surrounding countries such as Mozambique, which relied on that nation's corn exports to feed large segments of the population displaced by civil war, and Malawi, where more than one million Mozambican refugees have fled.

For the first time ever, wildlife authorities at a national park in Zimbabwe plan to shoot 2,000 elephants and 5,000 impalas in the coming weeks and distribute the meat to local villagers left hungry by failing crops. They will also engage in large-scale relocation of rhinoceroses, hippopotamuses and other exotic animals in danger of dying from hunger.

## Mozambique

The United Nations estimates that 3.1 million Mozambicans will need food aid this year, as wells run dry and rivers such as the Limpopo and the Pungwe nearly cease flowing. These estimates exceed the number of those who needed assistance last year by 1.2 million, requiring a doubling of effort.

To complicate matters, user fees charged by airports add \$150 to the cost of transporting each ton of airlift relief. These fees are in response to pressure by the International Monetary Fund and the World Bank on developing country governments to balance their budgets.

## Kenya

After below-average rainfall in 1991, people in parts of Kenya are showing signs of severe malnourishment. Nomadic tribes are migrating to cities with little resources to trade or sell because of the increasing deaths of their livelihood: camels, goats and cattle. Disruption in hydroelectric supply has caused rationing of electricity in Nairobi, where neighborhoods must turn off their electricity for six hours a day, and factories must shut down for half the workweek.

Kenya, which usually exports food, will have to import 500,000 tons this year and ask for extra humanitarian supplies to feed refugees from Somalia.

## India

Cyclical, regional droughts are not unusual for India, but the last two planting seasons have been devastated by insufficient rains, reducing agricultural output by 35 percent in Maharashtra state alone, one of the most densely populated areas. Civil unrest is apparent as people emigrate from rural areas that can no longer sustain them and gather in cities where employment is hard to come by. In Beed, central India, two million people must struggle to survive under normal conditions, but now their subsistence is precarious as farmers leave their land and villages for the forest to search for food as hunter-gatherers.

## United States

El Nino conditions contributed to excessive forest fires in eight of the last 40 years, according to Federal officials. After the warmest winter on record and one of the driest springs in a century, the West now fears a long season of forest fires. A severe insect infestation in trees weakened by drought has struck the national forests of Idaho, Montana, Oregon and Washington leaving them particularly vulnerable to catastrophic fire. (Report written by Joyce Wilson.)

**At Rio**

*(Continued from page 1)*

Convention will enter into force 10 days after ratification by 50 State parties, the Biological Diversity Convention 90 days after ratification by 30.

The Rio Conference adopted and recommended for endorsement by the UN General Assembly at its next regular session:

- The Rio Declaration on Environment and Development
- Agenda 21, a voluminous program of action
- Statement of Principles on the Management, Conservation and Sustainable Development of All Types of Forests

<b>Convention Signatories</b>	<b>Climate Change</b>	<b>Bio-Diversity</b>	<b>Convention Signatories</b>	<b>Climate Change</b>	<b>Bio-Diversity</b>
Dem. People's Rep. of Korea	X	X	Netherlands	X	X
Denmark	X	X	New Zealand	X	X
Djibouti	X	X	Nicaragua	X	X
Dominican Rep.	X	X	Niger	X	X
Ecuador	X	X	Nigeria	X	X
Egypt	X	X	Norway	X	X
El Salvador	X	X	Oman	X	X
Estonia	X	X	Pakistan	X	X
Ethiopia	X	X	Panama		X
Finland	X	X	Papua New Guinea	X	X
France	X	X	Paraguay	X	X
Gabon	X	X	Peru	X	X
Gambia	X	X	Philippines	X	X
Germany	X	X	Poland	X	X
Ghana	X	X	Portugal	X	X
Greece	X	X	Qatar		X
Guatemala	X	X	Rep. of Korea	X	X
Guinea	X	X	Rep. of Moldova	X	X
Guinea-Bissau	X	X	Romania	X	X
Guyana	X	X	Russian Federation	X	X
Haiti	X	X	Rwanda	X	X
Honduras	X	X	St. Kitts & Nevis	X	X
Hungary	X	X	Samoa	X	X
Iceland	X	X	San Marino	X	X
India	X	X	Sao Tome & Principe	X	X
Indonesia	X	X	Senegal	X	X
Iran		X	Seychelles	X	X
Ireland	X	X	Singapore	X	
Israel	X	X	Slovenia	X	X
Italy	X	X	Solomon Islands	X	X
Jamaica	X	X	Spain	X	X
Japan	X	X	Sri Lanka	X	X
Jordan	X	X	Sudan	X	X
Kazakhstan	X	X	Suriname	X	X
Kenya	X	X	Swaziland	X	X
Kiribati	X		Sweden	X	X
Kuwait		X	Switzerland	X	X
Latvia	X	X	Thailand	X	X
Lebanon	X	X	Togo	X	X
Lesotho	X	X	Trinidad & Tobago	X	X
Liberia	X	X	Tunisia	X	X
Liechtenstein	X	X	Turkey		X
Lithuania	X	X	Tuvalu	X	X
Luxembourg	X	X	Uganda	X	X
Madagascar	X	X	Ukraine	X	X
Malawi	X	X	Un. Arab Emirates		X
Malaysia		X	United Kingdom	X	X
Maldives	X	X	Un. Rep. of Tanzania	X	X
Malta	X	X	United States	X	
Marshall Islands	X	X	Uruguay	X	X
Mauritania	X	X	Vanuatu	X	X
Mauritius	X	X	Venezuela	X	X
Mexico	X	X	Viet Nam	X	
Micronesia (Fed. Sts. of)	X	X	Yemen	X	X
Monaco	X	X	Yugoslavia	X	X
Mongolia	X	X	Zaire	X	X
Morocco	X	X	Zambia	X	X
Mozambique	X	X	Zimbabwe	X	X
Myanmar	X	X	EEC	X	X
Namibia	X	X			
Nauru	X	X			
Nepal	X	X			

## Study Urges

(Continued from page 1)

may be prudent to make major efforts to limit warming, policymakers should be aware that sizable costs are involved in taking precautions.

Recognizing the haziness of 300-year projections but concerned about economic — and political — lags in implementing plans, he sets forth a two-stage contingent policy response. In the first stage, countries would undertake best, but not legally binding, efforts to limit expansion of greenhouse gas emissions, pending an international scientific review by 2000. If the current diagnosis is confirmed, nations could then adopt intensified policies to limit warming.

The Cline study estimates global, warming damages over the very long term, the costs of limiting them, and outlines a benefit/cost policy response. While most economic analyses have estimated the cost of abatement using energy-economic models, Cline also examines the benefits of avoiding future warming.

Cline estimates that projected economic growth could boost global emissions from 6 billion tons of carbon to 20 billion tons by 2100 and 50 billion by 2299. When other greenhouse gases are included with carbon in the assessment, surface temperatures may be raised by 10 degrees C, the medium case, over the next 300 years and 18 degrees C (the upper bound case) — far higher than the 2- 3 degrees C range usually associated with global warming.

Cline's economic damage estimates are based on a 1989 EPA study of absolute dollar costs for the present day U.S. economy plus percentage estimates of Gross Domestic Product (GDP) applied to much larger future levels of GDP in benefit cost analysis.

Taking present U. S. GDP as about \$6 trillion, Cline estimates the following annual losses for the U.S. at 2.5 degrees C (benchmark warming) in billions of dollars:

agriculture, from heat stress and drought - \$18 b.

sea level rise through thermal warming and glacial melting - \$7 b.

increased electricity for air conditioning (offset by reduced heating costs) - \$11 b.

curtailed water supply from decreased runoff in water basins - \$7 b.

increased urban pollution (tropospheric ozone) associated with warmer weather - \$4 b.

increased mortality (heat stress) - \$6 b.

lumber value (forest loss) - \$3 b.

ski industry loss - \$1.5 b.

plus "softer" estimates for:

increased hurricane and forest fire damage

net infrastructure costs from increased immigration

species loss and "human disamenity"

TOTAL damages (with 2.5 degrees C warming) - close to \$60 billion or 1% of GDP. Counting species loss, human disamenity and overall damages, totals could reach 2% of GDP. (Such losses, for example, to the small island states would, of course, be much greater.) TOTAL damages in the very long-term (with 10 degrees C warming) - approximately \$335 billion.

Very long-term damage is nonlinear, according to Cline. Going from the medium case of 2.5 degrees C in 2050 to the medium case 10 degrees C in 2300 does not multiply damages by 4, from 1% to 4% of GDP, but reaches 6%. With greater nonlinearity or based on upperbound warming of 18 degrees C, damages could reach 20% of GDP.

The warming of the earth's surface could be delayed two or three decades, for example from 2020 to 2050, says Cline, because the ocean initially absorbs the heat. The interruption, from 1930 to 1970, of the 100-year rise in global mean temperatures, Cline hypothesizes, may have been due to urban pollution masking potential warming; as urban pollution is reduced, he suggests, the long-term trend will resume.

Acknowledging that it may take decades to gather statistical evidence to prove global warming, Cline argues that, "the overall empirical record provides substantial support to the theory." For public policy purposes, he suggests it is "appropriate to invoke a 'constitutional majority' rule," adducing that "at least a two-thirds majority of informed scientists consider the greenhouse effect to be a highly likely phenomenon."

Cline estimates that increased energy efficiency measures may cut carbon emissions by 20 - 25 % (excluding deforestation) at zero cost. Beyond that, he cites reducing deforestation as the lowest cost method of cutting emissions, "an order of magnitude smaller than the typical model estimates of the marginal cost of industrial cutbacks."

In his analysis, he used four leading quantitative models of the cost to the economy of limiting carbon emissions: Manne and Richels, Edmonds and Reilly, Jorgenson and Wilcoxon, and Burniaux et al. Most of the models indicate a 2 percent loss of GDP by cutting back carbon emission levels to 50 percent of 1990 rates by about 2050. Cutbacks larger than 50 percent of course increase costs, but over time, advances in technology allow costs to fall. Carbon permit trading between nations could reduce global abatement costs by as much as half, Cline states, by shifting the cutbacks to areas where they have the smallest impact.

The discount rate is a crucial variable in this very long term policy analysis, especially when there is a lag between abatement costs and later benefits of limiting warming. Using the rate of growth of per capita income as a base, Cline's analysis arrived at an overall discount rate of two percent annually.

He compares benefits and costs of an aggressive global policy to limit the effects of greenhouse warming: cutting annual carbon emissions by one-third and keeping them at that level for three centuries. Limiting the other greenhouse gases — methane, nitrous oxide, ozone, CFCs — adds 20 percent to costs. Assuming that 20 percent of damages cannot be avoided, Cline sets benefits at 80 percent of greenhouse damages.

He lists the measures of an aggressive global policy as follows:

- Initially, move to existing best energy-saving practices such as increased use of compact fluorescent lights
- During the first 30 years, employ forestry measures at low cost: reduced tree-cutting, increased afforestation
- Phase in carbon taxes of \$100 to \$250 per ton

(Continued on page 7)

## Study Urges

(Continued from page 6)

- By 2040, peak total abatement costs are estimated to reach 3.5% of GDP

- Thereafter, a plateau of costs at 2.5% of GDP can be set

If policy makers are risk averse and more inclined to avoid higher cost damages than lower, according to this analysis the present value of benefits exceeds that of abatement costs at a ratio of approximately 1.3 to 1. Even if a discount rate of 5% instead of 2.5% is used, the small probability of a catastrophe would push the benefit-cost ratio into the range suitable for aggressive action.

In view of this outcome, Cline recommends an international program of aggressive abatement to curtail the greenhouse effect. But because the costs are potentially large and pending more certain scientific confirmation, especially for very long-term warming, he suggests a two-stage approach.

In the first stage, nations would make a "best-effort" but not legally binding commitment to limit carbon emissions by the year 2000 to 1990 levels. Those that were prepared to undertake tougher measures would be encouraged to set an "emulatory initiative," an example to other countries. Their compensation would be a competitive advantage in developing

carbon-spare technologies for the 21st century.

Other countries could impose carbon taxes, rising by perhaps \$5 a year to \$40 a ton (12 cents per gallon of gasoline) by 2000. They would also be encouraged to remove existing subsidies to carbon emissions. A moderate portion of carbon tax revenue, perhaps 10%, could be channeled to developing countries to support their shift to fossil-fuel efficiency and to limit deforestation.

In the second policy stage, if the scientific outlook is confirmed by 2000, the international community would move to a stronger regime, with higher and more uniform taxes across countries. Or international carbon emissions quotas could be set, taking into consideration existing GDP and carbon emissions shares and giving some weight to population base. Tradeable permits could be introduced.

Cline concludes, "the eventual extent and damages of global warming are so severe that there is greater risk in doing nothing." There is not time to wait and see, and intervene in the future, he argues. The long physical lags between committed and realized warming — and the ensuing long political lags before taking action — would require extremely difficult, wrenching adjustments if there had been no earlier, more moderate discipline.

(The 100-page summary study, *Global Warming: The Economic Stakes*, (\$12) and the book-length analysis, *The Economics of Global Warming*, (\$20 in paperback; \$40 in hardback) may be ordered: ATT Publications Department, International Institute for International Economics, 11 Dupont Circle, NW, Washington, DC 20036-1207. Toll free number: 1-800-229-ECON. FAX: 202/328-4532. Add \$4 for shipping and handling for each version ordered.)

## Workshop on Global Warming and Regional International Bodies

The role of Regional International Organizations in the Context of Global Warming is the theme of a NATO Advanced Research Workshop to be held 5-8 October in Paris, France. The workshop will assess policy options countries and regional organizations might pursue as risks of regional conflicts increase. Topics include: 1) possible shift of highly valued regional resources; 2) trans-boundary water resources; and 3) trans-boundary marine fisheries.

Contact: Michael Glantz, National Center for Atmospheric Research, Phone: 303/497-8119, FAX 303/497-8125.

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\_\_\_\_\_ Please send me \_\_\_\_\_ copy/copies of *The Arctic and Global Change*, October 25-27, 1989, Ottawa, Ontario, Canada. Cost: \$25 plus \$2 for postage and handling.

\_\_\_\_\_ Please send me \_\_\_\_\_ copy/copies of the *Proceedings* of the North American Conference on Forestry Responses to Climate Change, May 15-17, 1990, Washington, D.C. \$35 postpaid.

\_\_\_\_\_ Please send me \_\_\_\_\_ set/sets of greenhouse effect slides. Approximately 40 slides with accompanying talking points script. Cost: \$85 plus \$10 shipping and handling.

Circle language(s) you wish to order: English, Spanish, Turkish, Indonesian, Arabic, French, Chinese, Russian, Portuguese

### CONTRIBUTIONS

\_\_\_\_\_ I am making a tax deductible contribution of \$\_\_\_\_\_ to support the Institute **TOTAL AMOUNT ENCLOSED:** \$\_\_\_\_\_

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# Eight Nations

(Continued from page 1)

The ADB is addressing two other countries, China and Thailand, through separate contracts but with a similar intention of developing cooperative regional strategies. All of these studies are being undertaken by the ADB's Office of Environment.

Under the umbrella of the contract, which amounts to \$1,450,000, the Institute has drawn such groups as ICF Incorporated of Washington, DC, which will carry out the principal energy option analyses and CSIRO Australia which will provide the scientific lead.

The Institute's eligibility for such a contract was enhanced by its activities over the past year and a half, organizing briefing teams of top world experts who made presentations to ministers or heads of government of over 40 nations and diplomats of about 50 nations. The pre-

sentations lasted from several hours to several days. The Institute has also actively participated in the IPCC process, particularly in assisting in the 1990 report of WG II concerning climate change impacts on human settlement, the energy, transportation, and industry sectors, and human health.

Since its inception in 1986, the Institute has organized a series of international meetings, including one in London and another in Oxford this spring, the Cairo World Conference, two symposia at the UN this year and one in 1988, two North American Conferences, and such specialized meetings as those on the Arctic, Forests, the Cities and Africa.

With the expectation that post-UNCED progress on climate issues is likely to take place largely at the regional level, and with Asian developing countries well placed in this respect through the initiatives of the ADB, the project has the potential to form the basis for coop-

erative regional climate change policies in Asia. The project will address sensitive topics such as energy alternatives, coastal protection options, and agriculture and land use policy. It will develop environmental impact assessment criteria for climate change which may be incorporated in ADB project evaluations.

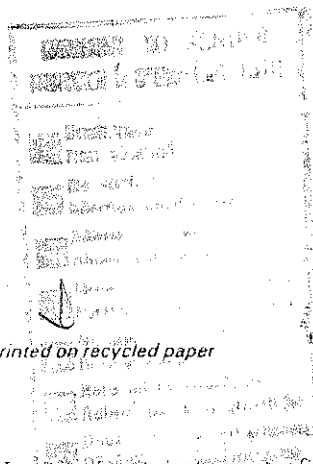
Dr. Ata Qureshi, Institute Director of Global Environment Programs, is Project Director. John Topping, President of the Institute, will serve as editor of the final report. He will be assisted in Washington by David Hobbie, Director of Impacts Research. Board of Advisor members Dr. Nobuo Mimura, Dr. Michael Glantz, Dr. Graeme Pearman and Dr. Suresh Sinha have participating roles.

Besides the ADB, the contract is sponsored by three national governments, Australia, Japan and Norway.

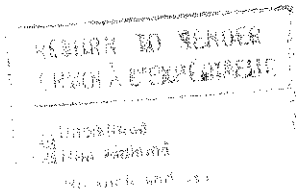
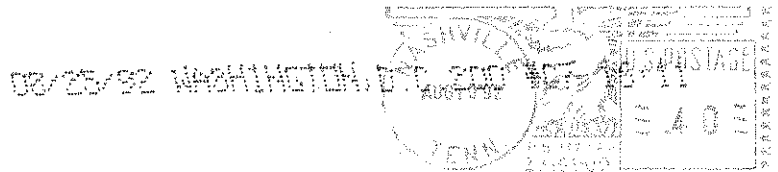


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The Climate Institute is a private nonprofit organization formed to advance public understanding of climate change including the greenhouse effect and of strategies to avert stratospheric ozone depletion.



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